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01 July 1998

Mr. Bob Haslam
Department of Environmental Conservation
Waste Management Division
103 South Main Street, West Building
Waterbury, Vermont 05671-0404

RE: *Expressway Initial Site Investigation Report*
SMM Realty Winooski, VT

Dear Mr. Haslam:

Enclosed is one bound copy of the Initial Site Investigation Report for SMM Realty in Winooski, VT, which was completed under the Expressway notification process.

Please call me if you have any questions or comments regarding this report.

Sincerely,

Marin Environmental

Ron Miller
Hydrogeologist and Regional Manager

RWM:bbd/98021C01.DOC
enclosure

cc. Mr. Shaun McLaughlin, SMM Realty

WASTE MANAGEMENT
DIVISION

JUL 15 1 51 PM '98



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JUL 15 1 51 PM '98

WASTE MANAGEMENT
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INITIAL SITE INVESTIGATION REPORT

SMM REALTY

262 Main Street
Winooski, VT

29 June, 1998

Prepared for:

SMM Realty

262 Main Street
Winooski, Vermont 05404

Contact: Mr. Shaun McLaughlin
Phone: 802-655-9710

Prepared by:

Marin Environmental, Inc.

1700 Hegeman Avenue
Colchester, Vermont 05446

Contact: Ron Miller, Hydrogeologist and Regional Manager
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Marin Project #: VT98-0021
Marin Document #: 98021R02.DOC

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	<i>i</i>
1.0 INTRODUCTION	1
1.1 Site Location and Physical Setting	1
1.2 Site History	1
1.3 Objectives and Scope of Work	2
2.0 INVESTIGATIVE PROCEDURES AND RESULTS	3
2.1 Monitoring Well Installation	3
2.2 Soil-Screening Results	3
2.3 Determination of Ground-Water Flow Direction and Gradient	3
2.4 Ground-Water Sampling and Analysis	4
3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT	6
3.1 Sensitive Receptor Survey	6
3.2 Risk Assessment	6
4.0 CONCLUSIONS	7
5.0 RECOMMENDATIONS	8
6.0 REFERENCES	9

Tables	Table 1	Ground-Water Elevation Calculations
	Table 2	Summary of VOC Analytical Results

APPENDIX A:

Figures	Figure 1	Site Location Map
	Figure 2	Site Map
	Figure 3	Ground-Water Contour Map
	Figure 4	Contaminant Distribution Map

APPENDIX B: Griffin International Subsurface Investigation

APPENDIX C: Laboratory Report Forms

EXECUTIVE SUMMARY

Marin Environmental, Inc. (Marin) has conducted an initial site investigation at SMM Realty located in Winooski, Vermont and has concluded the following:

- Petroleum releases from former underground storage tank (UST) systems at the site appear to have resulted in an impact to soil and ground water in the vicinity of the former UST systems.
- Adsorbed-phase soil contamination in the vicinity of the former USTs may represent a continuing source of ground-water contamination.
- The Vermont Groundwater Enforcement Standards (VGES) for benzene and ethylbenzene were exceeded in the ground-water sample collected from MW-4, which is located downgradient of the former USTs. Contamination of the principal regulated petroleum compounds benzene, toluene, ethylbenzene, and xylene (BTEX) in this well were similar to those observed during the previous monitoring event in December 1994. Contamination of the gasoline additive methyl-tertiary butyl ether (MTBE) in MW-4 was below the analytical detection limit of 50 parts per billion (ppb), which represents a significant decrease from December 1994, when MTBE was detected at 1,230 ppb.
- The contrast between the contaminated high BTEX concentrations and declining MTBE concentration in MW-4 suggests that gasoline was not being actively released from the UST systems at the time of their removal in April 1998.
- The Winooski River, located 3,800 feet south (downgradient) of the former USTs, does not appear to be impacted at this time.
- The downgradient extent of petroleum contamination has not been defined.
- Surficial soils at the site consist primarily pebbly marine sands to a depth of six feet overlying bedrock.
- On 21 May 1998, the water table was found to be about five feet below ground surface, and exhibited a southeasterly trending gradient of about 7.0 percent.

On the basis of the results of this investigation, Marin recommends that further work be performed to determine the extent of the residual contamination and the risk posed to sensitive receptors.

1. Install two additional downgradient soil borings/monitoring wells to determine the downgradient extent of the dissolved-phase gasoline plume; both between MW-4 and the downgradient residence adjacent to the site.
2. Screen nearby underground utility manholes and shutoffs, as well as utility entrances in nearby buildings that historically showed an apparent impact from on-site contamination for the possible presence of volatile organic compounds (VOCs), using a portable photoionization detector (PID).
3. Sample the existing and newly installed monitoring wells in September 1998, and analyze the samples for gasoline VOCs by EPA Method 8020.
4. Upon completion of the work described above, evaluate the appropriateness of long-term monitoring or active remediation of the site.
5. Complete a report summarizing the findings of the additional work outlined above, including time-series graphs for water-quality analytical results from each location and figures showing approximate sample locations, ground-water flow direction, and contaminant distribution.

1.0 INTRODUCTION

This report details the results of an initial site investigation conducted at SMM Realty located in Winooski, Vermont (Figure 1, Appendix A). This report has been prepared by Marin Environmental, Inc. (Marin) under the direction of Shaun McLaughlin, the owner of the former underground storage tanks (USTs). The site investigation was initiated, with Vermont Department of Environmental Conservation (VT DEC) approval, under the expressway notification procedure following the discovery of subsurface petroleum contamination during the removal of three petroleum USTs on 4 April 1998.

1.1 Site Location and Physical Setting

SMM Realty is located on U.S. Route 7 approximately one mile north of downtown Winooski. The geographic coordinates of the site are 44° 29' 60" N / 73° 10' 40" W. The site is occupied by a single-story wood-framed structure, which currently serves as an automobile repair shop (Figure 2, Appendix A). The ground surface generally slopes down toward the south. The site elevation is about 300 feet above mean sea level (amsl). The Winooski River is located approximately 3,800 feet south of the former USTs (USGS 1948). The site and adjacent properties are supplied with natural gas and municipal water and sewer services.

The eastern property boundary is formed by U.S. Route 7. A housing complex is located across U.S. Route 7 east of the site. The southern property boundary is formed by a former gasoline service station, which is a residence at this time. The north and west boundaries are formed by residences. A steep incline extends up on the west side of the property.

Native surficial materials in the vicinity of the site are mapped as pebbly marine sands (Stewart and MacClintock, 1970). Bedrock in the area is mapped as Winooski dolomite, which is composed primarily of buff-weathered pink, buff, and gray dolomite of the lower Cambrian age (Doll, 1961). No bedrock outcrops were observed on-site or on adjacent properties; however, bedrock was encountered at approximately six feet below ground surface (bgs) during the UST closure.

1.2 Site History

The site history prior to 1998 is presented in a report dated January 17, 1995, which was prepared by Griffin International, (Appendix B). Subsequent to Griffin International's investigation, on 6 April 1998, three 1,000 gallon gasoline underground storage tanks (USTs) were removed under the supervision of Marin Environmental, Inc.. The three gasoline USTs were located on the southeastern portion of the property (Figure 2, Appendix A).

Following excavation of the tops of the USTs, variable amounts of a gasoline/water mix were observed in each UST. Soils in the area of the three gasoline USTs showed evidence of petroleum releases, with strong gasoline odors and photoionization detector (PID) readings of up to 220.6 parts per million (ppm). A thin layer of free product was also observed on ground water.

Marin began an initial site investigation under the VT DEC "Expressway" process after receiving approval on 6 May 1998 from the VT DEC.

1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, Marin has:

- Collected and submitted a ground-water sample from an on-site monitoring well for laboratory analysis of volatile petroleum compounds.
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors.
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Monitoring Well Installation

On 6 April 1998, one additional monitoring well (MW-5) was installed in the excavation, bringing the number of on-site monitoring wells to three. MW-2 and MW-3 from the previous investigation have apparently been destroyed. Approximate monitoring well locations are shown on Figure 2.

MW-5 was installed with an excavator during the removal of the USTs. Soils in the excavation consisted of poorly sorted medium brown sands down to the top of bedrock, which was encountered at depth of approximately six feet below ground surface (bgs). Ground water was encountered in the excavation at approximately 3.5 feet bgs. Strong petroleum odors were noted throughout the excavation and a thin layer of free product was observed on ground water.

MW-5 was constructed of two-inch-diameter schedule 40 PVC, with 0.01-inch factory slotted screens. The screened section of the well was placed to intercept the water table, with the bottom of the well set at approximately six feet bgs. The well was backfilled with the excavated soils and protected by a flush-mounted steel roadbox. The well casing was topped with a water-tight compression cap.

2.2 Soil-Screening Results

PID readings associated with the well installation were based on the readings obtained during the UST closure assessment. PID readings on soil samples collected from the excavation, where MW-5 was installed, ranged from 147.3 to 220.6 parts per million (ppm), with an average of 172.5 ppm.

Marin field personnel screened soil samples from the excavation for the possible presence of volatile organic compounds (VOCs) using a Thermo Environmental model 580B photoionization detector (PID). The PID was calibrated in the field with an isobutylene standard gas to a benzene reference.

2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in a southerly direction, toward the Winooski River. The average gradient of the local ground-water table on 21 May 1998 was about 7.0 percent. Water-level measurements and elevation calculations for 21

May 1998 are presented in Table 1. The ground-water contour map in Figure 3 was prepared using this data.

The sand deposits comprising the shallow soil aquifer at the site typically exhibit effective porosities of about 0.3 to 0.4 and hydraulic conductivities of about .25 to 140 feet per day (Fetter, 1994). Assuming Darcian flow, these estimates combined with the calculated ground-water gradient of 7.0 percent to yield an estimated range of ground-water flow velocities in the surficial aquifer of between .05 and 33 feet per day.

TABLE 1. Ground-Water Elevation Data
Monitoring Date: 21 May 1998

Well I. D.	Top of Casing Elevation *	Depth to Water (feet, TOC)	Ground Water Elevation
MW-1	100	5.72	94.28
MW-4	96.76	5.45	91.31
MW-5	98.12	4.63	93.49

*Top of casing (TOC) and ground water elevations are relative to an arbitrary site datum of 100.00 feet

2.4 Ground-Water Sampling and Analysis

On 21 May 1998, a water sample was collected for laboratory analysis from MW-4. Samples could not be collected from MW-1 and MW-5, due to extremely low well recharge. Total BTEX (benzene, toluene, ethylbenzene, and xylenes) concentrations of (11,572 parts per billion - ppb) were detected in the sample collected from MW-4. The Vermont Groundwater Enforcement Standards (VGESs) for benzene and ethylbenzene was exceeded in MW-4. Ground-water analytical results are summarized below in Table 2; laboratory report forms are included in Appendix C.

Similar analytical results for BTEX in MW-4 were observed during a 21 December 1994 sampling event performed by Griffin International. Total BTEX concentrations in late 1994 were 13,250 ppb.

The gasoline additive methyl-tertiary butyl ether (MTBE) was not detected in the MW-4 sample. Although the detection limit of 50 ppb was higher than normal due to elevated levels of the BTEX compounds, nevertheless this result represents a significant decrease relative to December 1994, when the MTBE concentration was measured at 1,230 ppb. MTBE, a gasoline additive in widespread use since about 1980, is generally considered to be more mobile in soil and ground water. Its apparent absence in the most recent MW-4 sample suggest that the BTEX compounds detected represent residual contamination, and that gasoline was not being actively released from the UST systems at the time of their removal in April 1998.

MW-4 was purged and then sampled using a dedicated bailer and dropline. Purge water was discharged directly to the ground in the vicinity of each well. All field procedures were conducted in accordance with Marin standard protocols.

The ground-water sample was submitted to Endyne, Inc. of Williston, Vermont, where it was analyzed for the possible presence of benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl-tertiary butyl ether (MTBE) by EPA Method 8020.

TABLE 2. Ground-Water Analytical Results
Monitoring Date: 21 May 1998

SAMPLE I. D.	Benzene	Ethyl benzene	Toluene	Xylenes	Total BTEX	MTBE
MW-4	2,380	1,490	822	6,880	11,572	<50
VGES	5	700	1,000	10,000	—	40

Results reported as parts per billion (ppb), unless noted otherwise.

ND = Compound not detected above indicated detection limit.

TBQ = Compound detected at trace levels below quantitation limit indicated.

VGES = Vermont Groundwater Enforcement Standard.

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

3.1 Sensitive Receptor Survey

Marin conducted a survey to identify sensitive receptors in the vicinity of SMM Realty. The following sensitive receptors were identified in the vicinity of the site:

- Underground utilities (natural gas, municipal water and sewer) are located within the observed areas of petroleum contaminated soil and downgradient of the site.
- A private residence with a basement is located approximately 75 feet south (downgradient) of the former USTs.
- SMM Realty is constructed on an at-grade slab foundation, located adjacent to the former USTs.
- The Winooski River is located approximately 3,800 feet south of the former USTs.

3.2 Risk Assessment

Marin assessed the risks that the residual subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

The findings of our risk assessment indicate the extent of downgradient ground-water petroleum contamination has not yet been determined, so the risks to downgradient utilities and residences cannot be fully evaluated. Ambient air in SMM Realty is not likely to be impacted by residual contamination, since it is constructed on an at-grade slab foundation. At this time, it appears unlikely that the Winooski River, located approximately 3,800 feet south (downgradient) of the former USTs.

4.0 CONCLUSIONS

Based on the results of the site investigation described above, Marin concludes the following:

- Petroleum releases from former underground storage tank (UST) systems at the site appear to have resulted in an impact to soil and ground water in the vicinity of the former UST systems.
- Adsorbed-phase soil contamination in the vicinity of the former USTs may represent a continuing source of ground-water contamination.
- The Vermont Groundwater Enforcement Standards (VGES) for benzene and ethylbenzene were exceeded in the ground-water sample collected from MW-4, which is located downgradient of the former USTs. Contamination of the principal regulated petroleum compounds benzene, toluene, ethylbenzene, and xylene (BTEX) in this well were similar to those observed during the previous monitoring event in December 1994. Contamination of the gasoline additive methyl-tertiary butyl ether (MTBE) in MW-4 was below the analytical detection limit of 50 parts per billion (ppb), which represents a significant decrease from December 1994, when MTBE was detected at 1,230 ppb.
- The contrast between the contaminated high BTEX concentrations and declining MTBE concentration in MW-4 suggests that gasoline was not being actively released from the UST systems at the time of their removal in April 1998.
- The Winooski River, located 3,800 feet south (downgradient) of the former USTs, does not appear to be impacted at this time.
- The downgradient extent of petroleum contamination has not been defined.
- Surficial soils at the site consist primarily pebbly marine sands to a depth of six feet overlying bedrock.
- On 21 May 1998, the water table was found to be about five feet below ground surface, and exhibited a southeasterly trending gradient of about 7.0 percent.

5.0 RECOMMENDATIONS

On the basis of the results of this investigation, Marin recommends that further work be performed to determine the extent of the residual contamination and the risk posed to sensitive receptors.

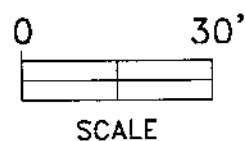
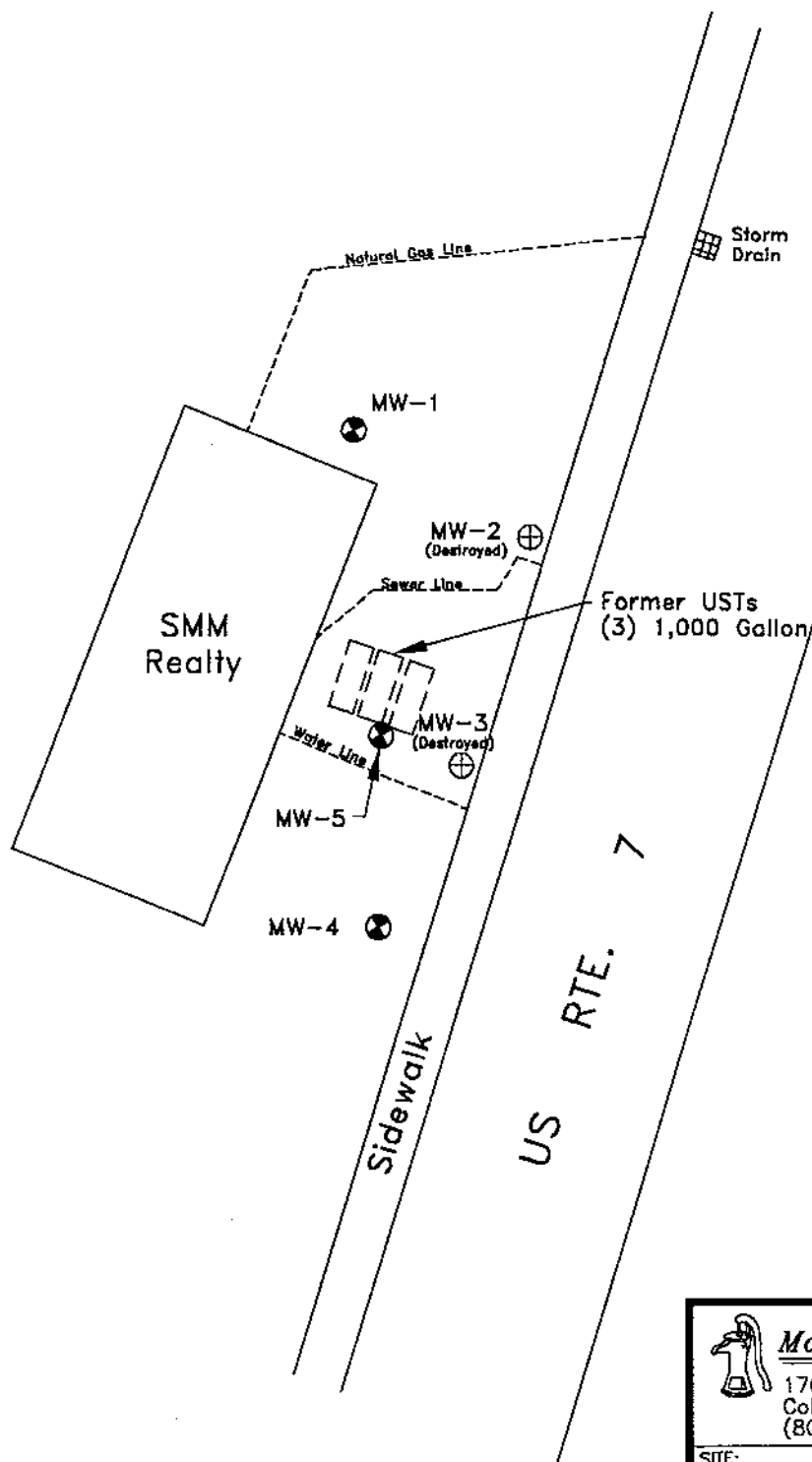
1. Install two additional downgradient soil borings/monitoring wells to determine the downgradient extent of the dissolved-phase gasoline plume; both between MW-4 and the downgradient residence adjacent to the site.
2. Screen nearby underground utility manholes and shutoffs, as well as utility entrances in nearby buildings that historically showed an apparent impact from on-site contamination for the possible presence of volatile organic compounds (VOCs), using a portable photoionization detector (PID).
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5. Complete a report summarizing the findings of the additional work outlined above, including time-series graphs for water-quality analytical results from each location and figures showing approximate sample locations, ground-water flow direction, and contaminant distribution.

6.0 REFERENCES

- Doll, C.G. and others, 1961. *Centennial Geologic Map of Vermont*, Office of the State Geologist.
- Domenico, P.A., and Schwartz, F.W., 1990. *Physical and Chemical Hydrogeology*, John Wiley and Sons, New York, 824 p.
- Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.
- Stewart, D.P. and MacClintock, P., 1970. *Surficial Geologic Map of Vermont*, Office of the State Geologist.
- USGS, 1972. Colchester, VT Quadrangle . U.S. Geological Survey. 7.5 minute series (topographic). 1972.
- USGS, 1987. Burlington, VT Quadrangle . U.S. Geological Survey. 7.5 minute series (topographic). 1987

APPENDIX A

Figures



ALL LOCATIONS ARE APPROXIMATE



Marin Environmental, Inc.

1700 Hegeman Ave.
Colchester, VT 05446
(802) 655-0011

SITE: SMM REALTY
WINOOSKI, VT

TITLE: FIGURE 2.
SITE MAP

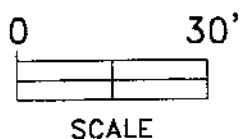
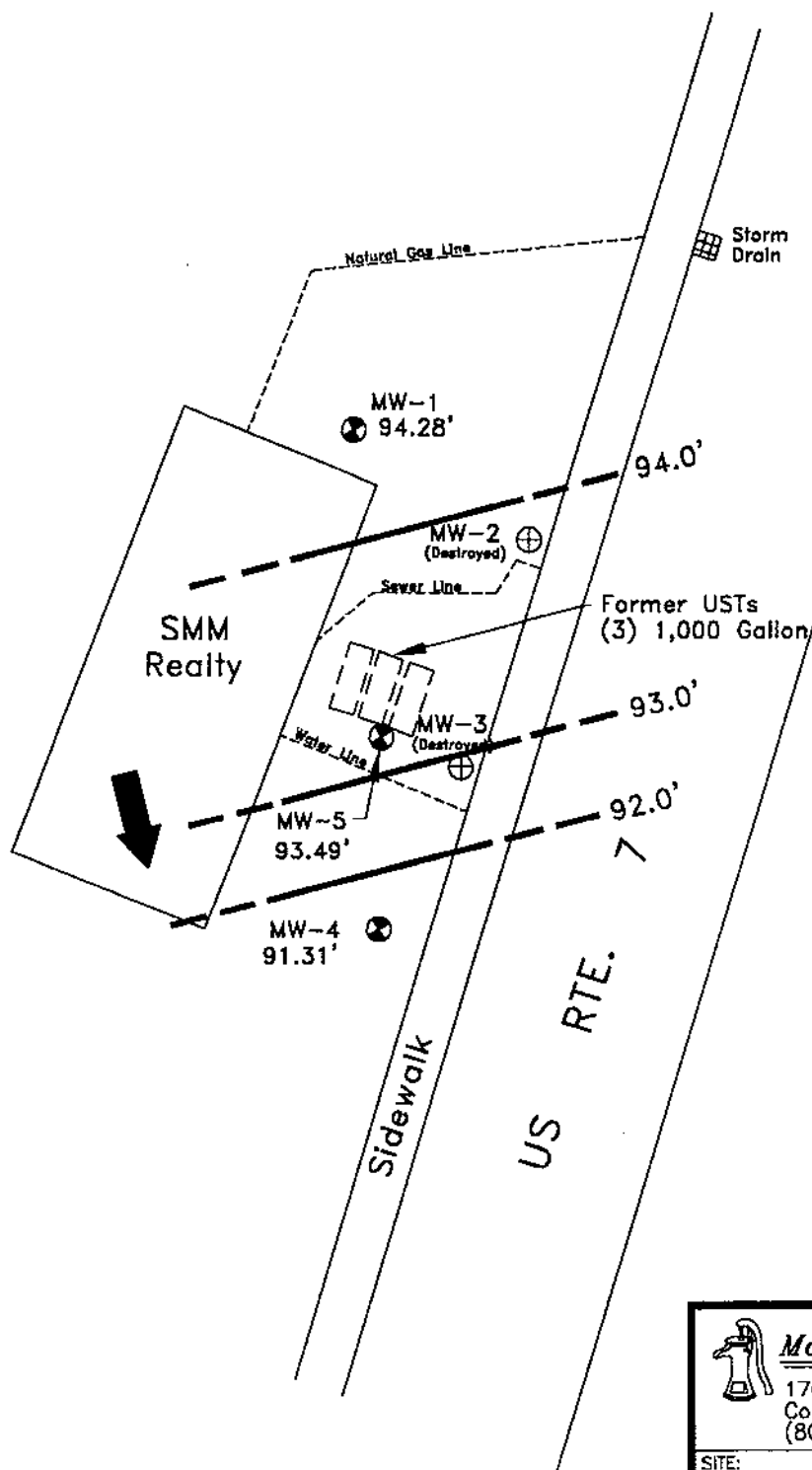
LEGEND:
Monitoring Well

DRAWN BY: MJB

DATE: JUNE 98

APPROVED BY: BD

FILE No.: 980021



ALL LOCATIONS ARE APPROXIMATE



Marin Environmental, Inc.

1700 Hegeman Ave.
Colchester, VT 05446
(802) 655-0011

SITE:

SMM REALTY
WINDOSKI, VT

TITLE:

FIGURE 3.
GROUND-WATER CONTOUR MAP
MONITORING DATE: 21 MAY 1998

LEGEND:

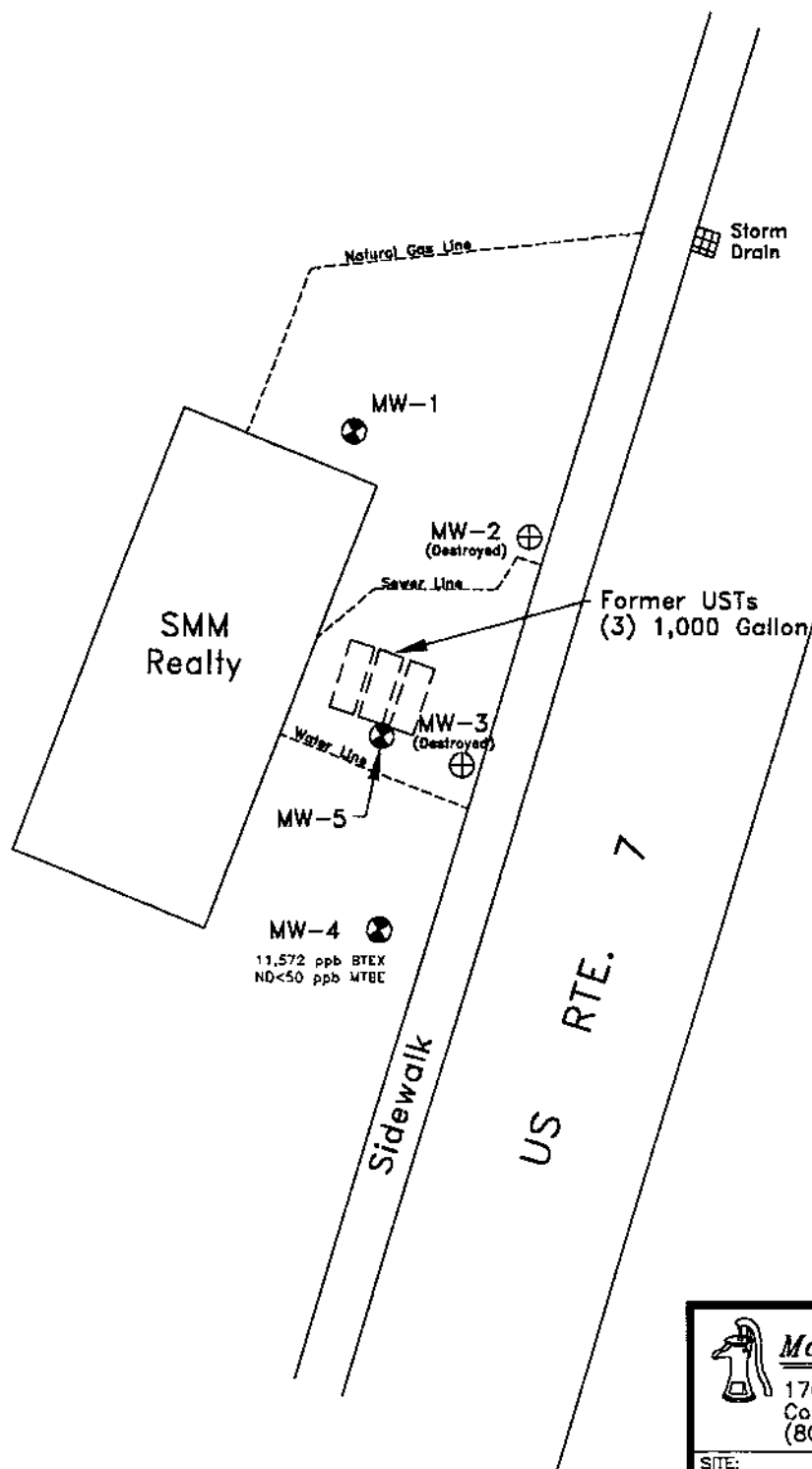
— Ground Water Contour
⊕ Monitoring Well
➔ Approx. Direction Groundwater Flow

DRAWN BY: MJB

DATE: JUNE 98

APPROVED BY: BD

FILE No.: 980021



MW-4
11,572 ppb BTEX
ND < 50 ppb MTBE



Marin Environmental, Inc.

1700 Hegeman Ave.
Colchester, VT 05446
(802) 655-0011

SITE:

**SMM REALTY
WINOOSKI, VT**

TITLE:

**FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
MONITORING DATE: 21 MAY 1998**

LEGEND:

⊕ Monitoring Well
ND NONE DETECTED

DRAWN BY:

MJB

DATE:

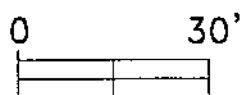
JUNE 98

APPROVED BY:

BD

FILE No.:

980021



SCALE

ALL LOCATIONS ARE APPROXIMATE

APPENDIX B

Griffin International Subsurface Investigation

REPORT ON THE INVESTIGATION OF SUBSURFACE PETROLEUM CONTAMINATION

JANUARY 17, 1995

Project Location:

**MCLAUGHLIN'S AUTO REPAIR
262 MAIN STREET
WINOOSKI, VERMONT 05404
(VERMONT DEC SITE #93-1388)**

Prepared For:

**MR. SHAUN MCLAUGHLIN
MCLAUGHLIN'S AUTO REPAIR
262 MAIN STREET
WINOOSKI, VERMONT 05404**

Prepared By:

GRIFFIN INTERNATIONAL, INC.
19 Commerce Street / P.O. Box 943
Williston, VT 05495
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TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	SITE BACKGROUND	
	A. Site History	1
	B. Site Description	2
III.	INVESTIGATIVE PROCEDURES	
	A. Monitoring Well Installation	2
	B. Groundwater Sample Collection and Analysis	4
	C. Determination of Groundwater Flow Direction and Gradient	4
	D. Sensitive Receptor Risk Assessment	5
IV.	CONCLUSIONS	6
V.	RECOMMENDATIONS	7

APPENDICES

A.	SITE MAPS	
	1) Site Location Map	
	2) Site Map	
	3) Groundwater Contour Map	
B.	GROUNDWATER QUALITY SUMMARY DATA	
C.	GROUNDWATER LEVEL DATA	
D.	MONITORING WELL LOGS	
E.	LABORATORY SAMPLE ANALYSIS REPORTS	

I. INTRODUCTION

The following report details the investigation of subsurface petroleum contamination at McLaughlin's Auto Repair located on Main Street in Winooski, Vermont. This investigation was conducted by Griffin International, Inc. for McLaughlin's Auto Repair in response to a request from the Vermont Department of Environmental Conservation (DEC) that an investigation be conducted to define the degree and extent of subsurface petroleum contamination at the site. The request came in a letter from Mr. Robert Haslam of the Vermont DEC to Mr. Shaun McLaughlin of McLaughlin's Auto Repair, dated February 7, 1994.

Work conducted as part of this investigation includes the installation of four monitoring wells at the site and the drilling of one additional soil boring. Also included is the collection and analysis of groundwater samples and a survey of potential sensitive receptors to petroleum contamination in the vicinity. The work presented here has been conducted in accordance with the Griffin Work Plan dated February 23, 1994, for this site, which was verbally approved by the DEC in a telephone conversation between Erik Sandblom of Griffin International and Robert Haslam of the Vermont DEC which took place on March 7, 1994.

II. SITE BACKGROUND

A. Site History

On May 6, 1993, petroleum contamination was detected in the subsurface at R&R Garage, owned by Robinson Fuels, Inc., on Main Street in Winooski during the routine removal of a 1,000 gallon underground storage tank (UST). The Vermont DEC requested that an investigation be conducted at the site to determine the extent and degree of subsurface petroleum contamination discovered during the UST removal. Later, the property was purchased by Shaun McLaughlin and the business became McLaughlin's Auto Repair.

On January 1, 1994, petroleum vapors were detected in the sewer main which runs directly beneath Main Street in Winooski, Vermont. In responding to this situation, the Vermont DEC contracted Griffin International, Inc. to perform an investigation to determine the source of the vapors, and to take measures to mitigate the problem. The investigation concluded that the source of the most significant petroleum contamination to the sewer pipe was most likely located between the upgradient and downgradient manholes surrounding McLaughlin's Auto Repair. The sewer main was vented through a manhole to extract vapors from the sewer, in order to prevent the infiltration of petroleum vapors to buildings connected to the sewer system. On February 28, 1994, the three gasoline USTs at the site were precision tested. One of the tanks failed the test, was emptied, and temporarily taken out of service.

On February 7, 1994 the Vermont DEC requested that McLaughlin's Auto Repair conduct an investigation to determine the extent and degree of subsurface contamination at the site and to prevent the infiltration of petroleum contamination to the Winooski sewer. McLaughlin's Auto Repair retained the services of Griffin International, Inc. to prepare a work plan and cost estimate

for the work requested by the DEC. The work outlined in the plan included the drilling of soil borings and installation of groundwater monitoring wells at the site if an adequate water table was encountered. Also included in the plan was the rehabilitation of the sewer service connection to McLaughlin's Auto Repair to account for the possibility of petroleum vapor impact through the sewer service connection. On March 22, 1994, the venting of the sewer manhole ceased due to the significant reduction of petroleum vapors detected in the sewer. As a result of this, the Vermont DEC approved of omitting the sewer service rehabilitation work from the work plan. This occurred in a telephone conversation between Erik Sandblom and Robert Haslam on June 6, 1994.

B. Site Description

McLaughlin's Auto Repair is an automobile service and gasoline station located in an urban setting in Winooski, Vermont. The site is bordered to the north and west by residences, to the south by an auto body shop and across the road to the east by a housing complex. All buildings in the vicinity are serviced by the municipal water and sewer systems. Currently, three 1,000 gallon capacity gasoline USTs remain at the site, one of which is not in service. The majority of the site is paved. Soils underlying the site consist primarily of well graded medium sand and silty sand. Bedrock is encountered from 5.5 to 10.5 feet below the ground surface. The water table at the south end of the property extends from 4 to 5.5 feet below the ground surface, and no water table has been encountered on the north side of the property. The topography of the site slopes gradually down to the south. A steep exposed bedrock incline extends up on the west side of the property.

III. INVESTIGATIVE PROCEDURES

A. Monitoring Well Installation

On December 6, 1994, four groundwater monitoring wells (MW-1, MW-2, MW-3 and MW-4) and one soil boring (SB-1) were drilled to further determine the extent and degree of subsurface contamination at McLaughlin's Auto Repair. The locations of the wells and soil boring are displayed on the site map in Appendix A. The locations of the monitoring wells and the soil boring were chosen based on the assumption that the suspected petroleum contamination was located in the vicinity of the USTs and pump island. Wells were placed both upgradient and downgradient of the tanks and piping to surround the suspected area of contamination. A soil boring was not drilled on the west side of the USTs, however, due to limited space, and to avoid the possibility of damaging the underground sewer service connection to the building.

The wells were installed by Tri-State Drilling and Boring, Inc. of West Burke, Vermont with the use of a 4.25 inch inner diameter, truck mounted hollow stem auger drill rig under the direct supervision of a Griffin engineer. Continuous, two foot long soil samples were collected with the use of a two-inch diameter split spoon sampler. Soil types from each boring were noted and logged in detail. Each soil sample was screened for VOCs with a Photovac Micro Tip HL-2000 PID.

Each well was constructed with factory slotted, two inch diameter PVC pipe with a slot size of 0.010 inch, positioned as deep as possible to allow for maximum groundwater flow into the well. Screen lengths ranged from three to six feet in length. The wells were completed with a two inch diameter Schedule 40 PVC riser to just below the ground surface. The annulus between the well screen and the borehole was filled in with number one sized silica sand to approximately two feet above the well screen where it was sealed with a one-foot thick bentonite clay plug. A water-tight cap was placed at the top of each well and a flush-mounted manhole cover installed for protection. All wells were installed in accordance with Griffin protocols which comply with State and industry standards. Detailed well logs are included in Appendix D at the end of this report.

The soil boring (SB-1) was drilled on the north side of the property. Soils in this location consisted of silty sand with some fine gravel over silt and some medium gravel. Bedrock was encountered at 7.4 feet below grade, and no water was encountered. Screening of the soil samples for volatile organic compounds (VOCs) indicated a concentration in the soils of 1.2 parts per million (ppm) near the ground surface, to 6.2 ppm at 6 to 7.4 feet below grade.

Monitoring well 1 (MW-1) was installed near the northeast corner of the main building at the site. Split spoon samples revealed soil types ranging from light brown silty sand and gravel fill over a wet silt, sand, and clay mix. It appeared that most of the soil in this location was primarily non-native fill. An unusual tar-like odor was encountered at the bottom of the bore-hole. Screening of the soil samples indicated VOC concentrations of 15.8 ppm near the surface to 9.6 ppm at the bottom of the soil boring. Water was encountered at 5 feet and bedrock at 6.3 feet below the ground surface.

The location of MW-2 is along the east side of the pump island. It was drilled to a depth of 10.3 feet below grade, where auger refusal was encountered. Soils consisted of gravel fill over silty sand to bedrock. Much of the soil samples contained varying degrees of petroleum staining and all of the soil samples contained a strong petroleum odor. Soil screening results ranged from 183 ppm to 1,305 ppm as measured with the PID.

MW-3 is located on the east side of the three USTs. Data collected from this boring is similar to MW-2, except that bedrock was encountered at only 5.5 feet below grade. The soils were primarily sand and gravel fill over silt and sand. A strong petroleum odor was prevalent in all soil samples. PID readings ranged from 112 ppm to 1,166 ppm.

MW-3 was drilled on the southeast corner of the property. This location is the furthest hydraulically downgradient location on-site, based on expected groundwater flow. It was installed to a maximum depth of 6.8 feet below grade upon bedrock. Water was encountered at between five and six feet below grade. Soils encountered consist of sand and clay over silt and sandy silt over silty sand. VOC concentrations increased with depth ranging from 188 ppm at two feet below grade to 729 ppm at bedrock.

Immediately after installation, all wells were developed manually by removing water from the well with a bailer. All wells exhibited good flow into the well, evidenced by relatively rapid recharge rates.

B. Determination of Groundwater Flow

Once the monitoring wells were installed, they were allowed to stabilize for a period of approximately one week. After this period, depth to water measurements were taken with the use of a Keck interface probe for all four site related wells. These measurements were subtracted from the top of casing elevations, which were determined relative to an arbitrary datum of 100 feet at top of the casing for MW-2, to determine the water table elevation at each of the wells. From this data, the groundwater contours were interpolated onto the site map and the groundwater direction and gradient determined.

From the water level measurements summarized in Appendix C and the groundwater contour map displayed in Appendix A, the calculated groundwater flow for December 14, 1994 was generally to the south at a gradient of 5.0%. This flow pattern is likely given the soil types, local topography, and natural surface water drainage patterns towards the Winooski River.

C. Groundwater Sampling and Analysis

Immediately following the collection of groundwater elevation data, samples of the groundwater were collected from three of the four monitoring wells at McLaughlin's Auto Repair (MW-2, MW-3, and MW-4). A sample was not collected from MW-1 as not enough water was present in the well. Free floating petroleum product was not observed in any of the monitoring wells. All samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), common constituents found in petroleum products, and MTBE, a common gasoline additive, per EPA Method 602. Results of the laboratory analyses for those wells sampled on this date are summarized in Appendix B at the end of this report.

According to the results of the analyses, dissolved petroleum contamination was detected in all of the groundwater samples at levels exceeding Vermont Drinking Water Standards (VTDWS). The plume of dissolved petroleum contamination appears to be centralized in the vicinity of MW-3, based on the elevated concentration of contaminants detected in samples collected from this well. Concentrations of contamination detected in MW-2 were much lower than expected based on VOC concentrations detected in the soils at the time of drilling. This indicates that the majority of petroleum contamination is most likely adsorbed to soil in the vadose zone (above the water table).

All samples were collected according to Griffin's groundwater sampling protocol which complies with industry and State standards. Results from the analyses of the duplicate, trip blank and equipment blank samples indicate that adequate quality assurance and control (QA/QC) were maintained during sample collection and analyses.

D. Sensitive Receptor Risk Assessment

During the investigation of petroleum vapors in the Winooski sewer main, a potential receptor risk assessment was conducted to assess the risk associated with petroleum contamination in the sewer main, and in the subsurface at McLaughlin's Auto Repair. This risk assessment has continued as part of this site investigation at McLaughlin's Auto. A list of potential receptors identified in the vicinity of the site is included below, each followed by an assessment of its risk of impact from petroleum contamination at McLaughlin's Auto Repair.

Water Supply

The City of Winooski receives all of its water from the Champlain Water District (CWD) located in South Burlington, Vermont. CWD obtains water from Lake Champlain before it is treated and distributed. It is not likely that petroleum contamination detected at McLaughlin's Auto Repair could impact the water quality of Lake Champlain due primarily to the separation distance (>2 miles). No private or public water supplies are known to exist in the vicinity of the site. Therefore, no water supplies appear to be at risk of impact from subsurface petroleum contamination at McLaughlin's Auto Repair.

Surface Waters

The closest identified surface water to the site is the Winooski River located approximately 3,000 feet to the south of the site. Due to separation distance, it is not likely that petroleum contamination at McLaughlin's could impact the Winooski River by migrating through the subsurface. As the City of Winooski sewer system eventually discharges into the Winooski River, it may be possible that diluted concentrations of petroleum contamination was entering the Winooski River in the treated sewage effluent. However, it does not appear that this could occur any longer due to the ceased flow of contaminants from McLaughlin's Auto repair. Reasons for this are discussed in the section below.

Groundwater

The groundwater at the site has been determined to have been impacted by petroleum contamination through sampling and analysis. Judging from the calculated groundwater flow for the site and the determination of the approximate contaminant plume, it is possible that contaminated groundwater is flowing off of the site to the east, below Main Street and to the south, to the adjacent property.

City of Winooski Sewer System

In January of 1994, the sewer main located under Main Street in Winooski was discovered to be impacted with petroleum vapors which apparently originated in the vicinity of McLaughlin's Auto Repair. Some buildings located along Main Street were impacted with petroleum vapors.

All of these vapor impact problems were remedied by repairing improper or faulty drain traps or damaged sewer service pipes in the individual buildings.

The source of contamination to the sewer main appeared to originate primarily from the vicinity of McLaughlin's Auto Repair. To remove vapors from the sewer main, the pipe was vented through a manhole in close proximity to the suspected point of contaminant infiltration. A precision tightness test was performed for the three gasoline USTs and associated piping at the site. One of the tanks failed the test, was emptied of all liquid, and taken out of service. Near the end of March of 1994 vapor levels in the sewer main had dropped significantly indicating that the source of the contamination most likely originated from the failed UST.

This UST will remain out of service until it can be permanently closed and removed from the ground. All tanks at the site are intended to be removed and replaced, according to Shaun McLaughlin, owner of the site. During the installation of monitoring wells on December 6, 1994, the manholes in front of McLaughlin's Auto were screened with a PID. The results of the screening indicated that no VOCs were detected in the manhole head space above background levels. No complaints of petroleum vapors have been reported since the venting of the sewer has ceased. Based on the above information, it appears that the sewer main is no longer at high risk of impact from petroleum contamination due to the removal of the apparent source of contamination.

Buildings

The on-site building housing both McLaughlin's Auto Repair and Quality Auto Body is constructed upon a slab foundation and not likely to be impacted by petroleum contamination adsorbed in the soils near the building. The indoor air quality in the repair shop was screened for VOCs with a PID on the day of drilling. Although slightly elevated background readings were obtained in the building, it is most likely due to the nature of items used and stored in the building, rather than the infiltration of gasoline vapors to the building from the subsurface. No readings above background were obtained when screening possible routes of infiltration such as cracks in the floor or along the inside edges of the building.

A residence is located directly to the north of the site, most likely built on a basement cinder block foundation. There is little risk of petroleum vapor impact from adsorbed contamination at McLaughlin's Auto Repair, as indicated by the low levels of petroleum contamination detected in SB-1. All buildings to the west are located past a relatively steep exposed bedrock incline at a vertical elevation that is 10 to 15 feet greater than McLaughlin's Auto Repair. It is not likely that these buildings are at risk of being impacted by petroleum contamination at McLaughlin's Auto Repair.

V. CONCLUSIONS

Based on data collected at McLaughlin's Auto Repair in Winooski, Vermont, over the past year, we have made the following conclusions regarding petroleum contamination at the site:

- 1) Petroleum contamination is present in the groundwater (dissolved) and soils (adsorbed) in the vicinity of the three gasoline USTs and pump island at the site. No free floating petroleum product has been encountered in the subsurface. The contaminant plume appears to be centralized in the vicinity of the pump island and stretches to the south from there. The full extent of the south and east edges of the contaminant plume have not been accurately identified. However, it is possible that the plume extends out into Main Street and beyond the southern edge of the property.
- 2) Based on soil screening and groundwater sample analysis results, petroleum contamination in the subsurface appears to be primarily adsorbed contamination in the vadose zone.
- 3) The only potential sensitive receptor to petroleum contamination identified is the sewer main located under Main Street in front of McLaughlin's Auto Repair. However, it does not appear to be at risk any longer due to the removal from service of the apparent source of contamination, a 1,000 gallon gasoline UST.
- 4) Petroleum contamination in the subsurface at the site will most likely decrease eventually due to the natural processes of dilution, dispersion, degradation, and volatilization.

VI. RECOMMENDATIONS

Based on the above conclusions, Griffin makes the following recommendations:

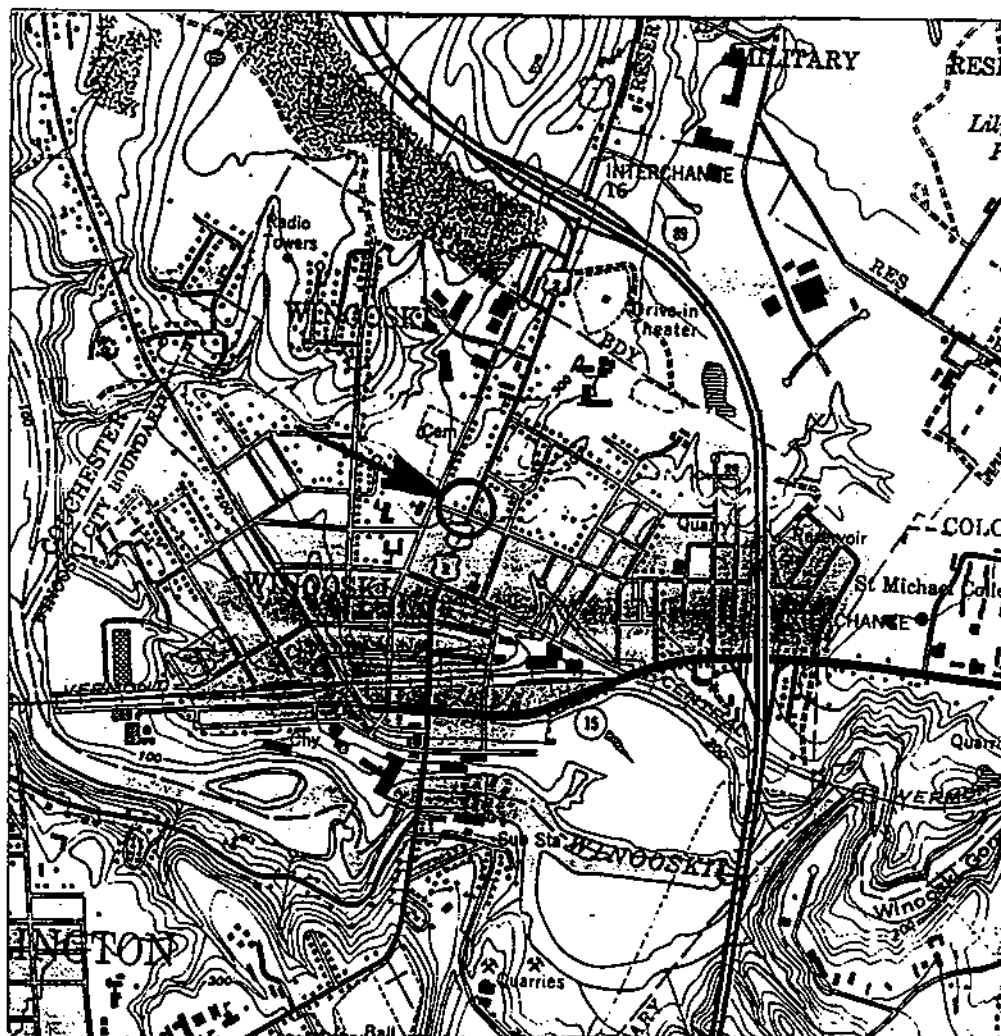
- 1) In order to adequately track and document the expected reduction in petroleum contaminant concentrations, the groundwater at the site should be monitored on a quarterly basis. Samples of the groundwater should be collected from all groundwater monitoring wells at the site, provided they contain adequate groundwater for sample collection. All samples should then be laboratory analyzed for BTEX and MTBE per EPA Method 602.
- 2) In order to ensure that the sewer main is not being impacted by petroleum contamination, the two sewer manholes in Main Street closest to the site should be screened with a PID also on a quarterly basis.
- 3) Due to the level of contamination detected in the subsurface at the site, a soil vapor extraction (SVE) pilot study should be conducted at the site in order to determine the feasibility of remediating contaminated soils at the site with a soil vapor extraction system. Remediating the soils at the site will significantly accelerate the reduction of petroleum contamination in the subsurface at the site. In addition, it will prevent the possibility of contaminants in the subsurface to migrate off site. The pilot test can be performed using the groundwater monitoring wells already installed at the site.

- 4) The owner of the site has indicated intentions to remove and replace the USTs at the site in the future. When this occurs, the sewer service line to McLaughlin's Auto should be replaced with a new pipe. As the USTs are located in close proximity to the sewer service line, a great deal of extra excavation will not be necessary. The replacement of the sewer service line would prevent the possibility of the infiltration of dissolved petroleum or vapors to the service connection. Any work related to the rehabilitation of the pipe should be covered by the Petroleum Cleanup Fund and the costs of which either counted towards the deductible, or reimbursed.

APPENDIX A

SITE MAPS

- 1) Site Location Map**
- 2) Site Map**
- 3) Groundwater Contour Map**



Call #: 2944483

SOURCE: USGS MAPS OF BURLINGTON AND COLCHESTER VERMONT

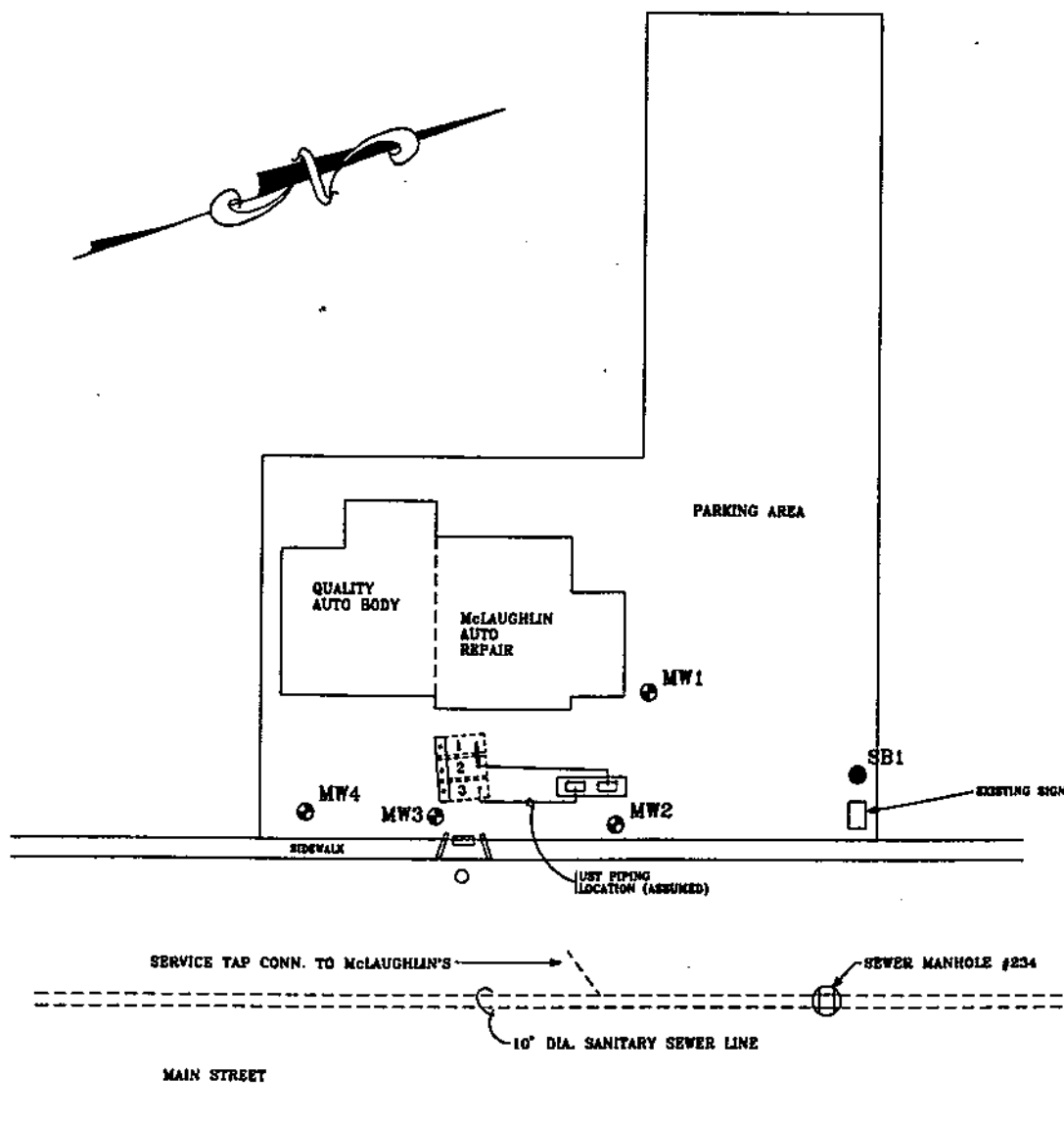


McLAUGHLIN AUTO
WINOOSKI,
SITE LOCATIONS

DATE: 2/21/94

DWG.#:1

SE



LEGEND

- MW2 MONITORING WELL
- SB1 SOIL BORE
- UTILITY POLE
- UNDERGROUND STORAGE TANK
- ▢ SERVICE PUMPS

JOB #: 2944483

REVISED 12/14/94: ADDED MW1, MW2, MW3, MW4 AND SB1 TO PLAN.

NOTE: SITE DRAWN FROM MAP PROVIDED BY CITY OF WINOOSKI ZONING BOARD.



McLAUGHLIN AUTO REPAIR

WINOOSKI, VERMONT

SITE MAP

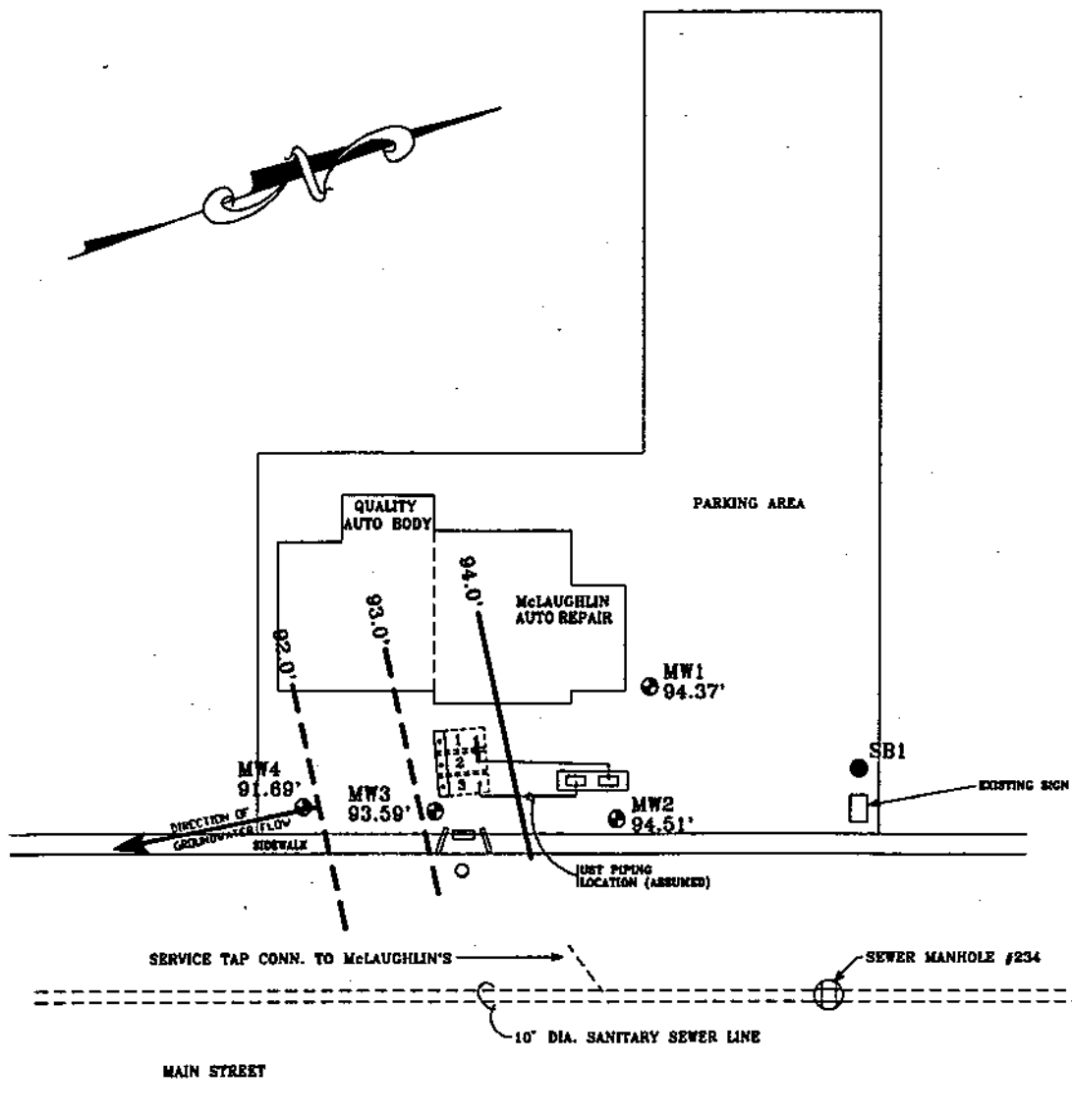
DATE: 12/14/94

DWG.#: 2

SCALE: 1"=40'

DRN.:SB

APP.:ES



LEGEND

- MW2 94.51' MONITORING WELL AND WATER TABLE ELEVATION IN FEET
- 93.0' GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)
- SB1 SOIL BORE
- UTILITY POLE
- UNDERGROUND STORAGE TANK
- ▭ SERVICE PUMPS

JOB #: 2944483

DATE MEASURED: 12/14/94

REVISED 12/14/94: ADDED MW1, MW2, MW3, MW4 AND SB1 TO PLAN.

NOTE: SITE DRAWN FROM MAP PROVIDED BY CITY OF WINOOSKI ZONING BOARD.



McLAUGHLIN AUTO REPAIR

WINOOSKI, VERMONT

GROUNWATER CONTOUR MAP

DATE: 12/20/94

DWG.#: 3

SCALE: 1"=40'

DRN.:SB

APP.:ES

APPENDIX B

GROUNDWATER QUALITY DATA SUMMARY

Groundwater Quality Summary
McLaughlin's Auto Repair
Winooski, Vermont

Monitoring Well : MW-1

PARAMETER	Date of Sample Collection					Vermont Drinking Water Standards
	12/14/94					
Benzene						5.0**
Chlorobenzene	No					100**
1,2-DCB	Sample					600**
1,3-DCB	Collected					600***
1,4-DCB						75**
Ethylbenzene						700**
Toluene						1,000**
Xylenes						10,000**
Total BTEX						-
MTBE						40***
BTEX + MTBE						-

Monitoring Well: MW-2

PARAMETER	Date of Sample Collection					Vermont Drinking Water Standards
	12/14/94					
Benzene	466.					5.0**
Chlorobenzene	ND					100**
1,2-DCB	ND					600**
1,3-DCB	ND					600***
1,4-DCB	ND					75**
Ethylbenzene	377.					700**
Toluene	757.					1,000**
Xylenes	1,610.					10,000**
Total BTEX	3,210.					-
MTBE	ND					40***
BTEX + MTBE	3,210.					-

Monitoring Well: MW-3

PARAMETER	Date of Sample Collection					Vermont Drinking Water Standards
	12/14/94					
Benzene	29,600.					5.0**
Chlorobenzene	ND					100**
1,2-DCB	ND					600**
1,3-DCB	ND					600***
1,4-DCB	ND					75**
Ethylbenzene	4,300.					700**
Toluene	73,900.					1,000**
Xylenes	26,500.					10,000**
Total BTEX	134,300.					-
MTBE	38,600.					40***
BTEX + MTBE	172,900.					-

All values reported in ug/L (ppb)

ND - None Detected

TBQ - Trace below quantitation Limits

** - EPA Established Maximum
Contaminant Level

*** - Vermont Health Advisory Level

Groundwater Quality Summary
McLaughlin's Auto Repair
Winooski, Vermont

Monitoring Well: MW-4

PARAMETER	Date of Sample Collection					Vermont Drinking Water Standards
	12/14/94					
Benzene	2,270.					5.0**
Chlorobenzene	ND					100**
1,2-DCB	ND					600**
1,3-DCB	ND					600***
1,4-DCB	ND					75**
Ethylbenzene	1,400.					700**
Toluene	3,450.					1,000**
Xylenes	6,130.					10,000**
Total BTEX	13,250.					-
MTBE	1,230.					40***
BTEX + MTBE	14,480.					-

**Vermont Drinking Water Standards and
Quality Assurance and Control Samples**

Sample Date: December 14, 1994

PARAMETER	Equip. Blank	Trip Blank	Duplicate (MW-2)	Vermont Drinking Water Standards
Benzene	ND	ND	437.	5.0*
Chlorobenzene	ND	ND	ND	100*
1,2-DCB	ND	ND	ND	600*
1,3-DCB	ND	ND	ND	600**
1,4-DCB	ND	ND	ND	75*
Ethylbenzene	ND	ND	356.	700*
Toluene	ND	ND	718.	1,000*
Xylenes	ND	ND	1,540.	10,000*
Total BTEX	0	0	3,051.	-
MTBE	ND	ND	ND	40**
BTEX + MTBE	0	0	3,051.	-

All values reported in ug/L (ppb)

ND - None Detected

TBQ - Trace below quantitation Limits

** - EPA Established Maximum Contaminant Level

*** - Vermont Health Advisory Level

APPENDIX C

GROUNDWATER LEVEL DATA

1/13/95

**Liquid Level Monitoring Data
McLaughlin's Auto Repair
Winooski, Vermont**

**Monitoring Date:
December 14, 1994**

Well I.D.	Well Depth	Top of Casing Elevation	Depth to Product	Depth to Water	Product Thickness	Specific Gravity of Product	Hydro Equivalent	Corrected Depth to Water	Corrected Water Table Elevation
MW-1	5.7	99.83	-	5.46	-	-	-	5.46	94.37
MW-2	10.0	100.00	-	5.49	-	-	-	5.49	94.51
MW-3	5.5	97.65	-	4.06	-	-	-	4.06	93.59
MW-4	6.5	96.75	-	5.06	-	-	-	5.06	91.69

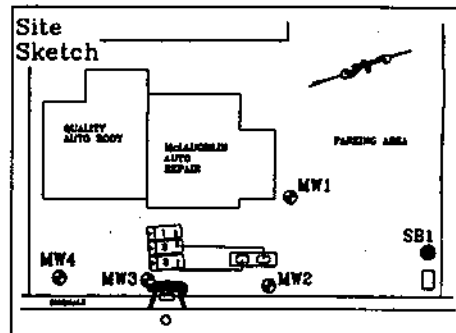
Notes: All values reported in feet.

APPENDIX D

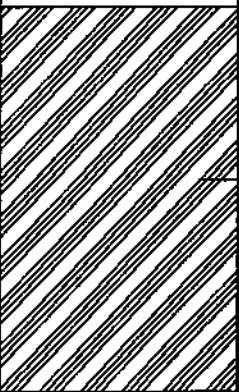

MONITORING WELL LOGS

PROJECT McLAUGHLINS AUTO
 LOCATION WINOOSKI, VERMONT
 DATE DRILLED 12/6/94 TOTAL DEPTH OF HOLE 7.4'
 DIAMETER _____
 SCREEN DIA. NA LENGTH NA SLOT SIZE NA
 CASING DIA. NA LENGTH NA TYPE NA
 DRILLING CO. TRI-STATE DRILLING METHOD HSA
 DRILLER RAY & STORM LOG BY E. SANDBLOM

WELL NUMBER SB1

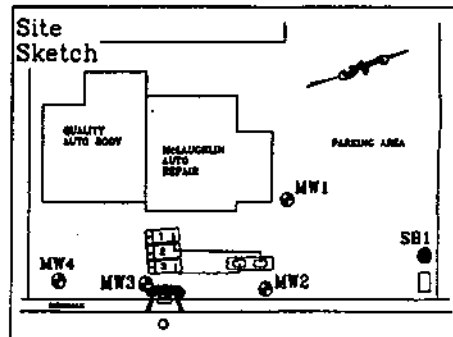


GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		NATIVE BACKFILL	0'-.3'	Pavement	0
1			.3'-2'- 1.2,5.7 1.2 ppm	Light brown silty SAND with fine gravel, damp.	1
2			2'-4'- 4.5,3.5 2.0 ppm	Brown silty SAND with fine gravel, some red sand at 3.5', dry.	2
3			4'-6'- 3.2,3.5 3.7 ppm	Light brown SILT with some sand, damp.	3
4			6'-7.4'- 6.5,10.7 6.2 ppm	Light brown SILT over red moist SILT and GRAVEL (weathered shale), dry.	4
5				END OF EXPLORATION AT 7.4'	5
6					6
7		BEDROCK			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT McLAUGHLINS AUTO
 LOCATION WINOOSKI, VERMONT
 DATE DRILLED 12/6/94 TOTAL DEPTH OF HOLE 6.3'
 DIAMETER _____
 SCREEN DIA. 2" LENGTH 3' SLOT SIZE 0.010"
 CASING DIA. 2" LENGTH 2.8' TYPE sch. 40 pvc
 DRILLING CO. TRI-STATE DRILLING METHOD HSA
 DRILLER RAY & STORM LOG BY E. SANDBLOM

WELL NUMBER MW1

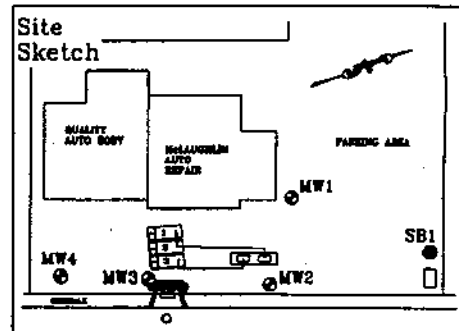


GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0	ROAD BOX LOCKING WELL CAP				0
1	CONCRETE		0'-2'- 2,1,1,2 15.8 ppm	Light brown silty SAND and GRAVEL, moist, no petroleum odor.	1
2	BENTONITE				2
3	WELL RISER		2'-4'- ham,1ham,1 2.0 ppm	Surface gravel with silty SAND (fill).	3
4	SAND PACK				4
5	WELL SCREEN		4'-6'- 1,1,1,4 11.6 ppm	5.0' WATER TABLE	5
6	BOTTOM CAP			Light brown moderately hard SILT/SAND/CLAY mix., wet.	6
7	UNDISTURBED NATIVE SOIL		6'-6.3'- 10 blows 9.6 ppm	Brown and red silty CLAY, tar-like odor.	7
8				BASE OF WELL AT 6.3' END OF EXPLORATION AT 6.3'	8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT McLAUGHLINS AUTO
 LOCATION WINOOSKI, VERMONT
 DATE DRILLED 12/6/94 TOTAL DEPTH OF HOLE 10.3'
 DIAMETER _____
 SCREEN DIA. 2" LENGTH 6' SLOT SIZE 0.010"
 CASING DIA. 2" LENGTH 3.5' TYPE sch. 40 pvc
 DRILLING CO. TRI-STATE DRILLING METHOD HSA
 DRILLER RAY & STORM LOG BY E. SANDBLOM

WELL NUMBER MW2

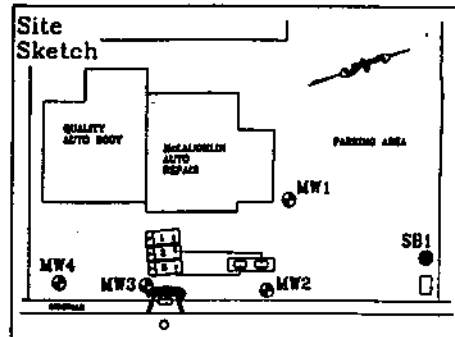


GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0	ROAD BOX LOCKING WELL CAP			Pavement	0
1	CONCRETE			Brown/gray/white/red GRAVEL FILL with coarse SAND, dry, strong pet. odor.	1
2	SAND/NATIVE BACKFILL		3'-2'- 2,28,21,21 1198 ppm		2
3	BENTONITE		2'-4'- 4,8,4,4 1305 ppm	Hard silty SAND, some staining, dry strong petroleum odor.	3
4	WELL RISER				4
5			4'-6'- 2,1,2,2 997 ppm	Brown stained SILT and SAND with some medium gravel, pet. odor.	5
6	SAND PACK				6
7	WELL SCREEN		6'-8'- 4,3,5,7 183 ppm	7.0' WATER TABLE	7
8				Brown/gray SAND and SILT with gravel, wet, strong petroleum odor.	8
9	BOTTOM CAP		8'-10'- 2,8,5,3 963 ppm	Gray, heavily stained SILT and SAND, saturated, over hard orange CLAY and SILT, medium to strong pet. odor.	9
10			10'-10.3'- 6 blows 110 ppm	Light brown SAND with some silt, saturated, strong petroleum odor.	10
11	BEDROCK				11
12				BASE OF WELL AT 10' END OF EXPLORATION AT 10.3'	12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

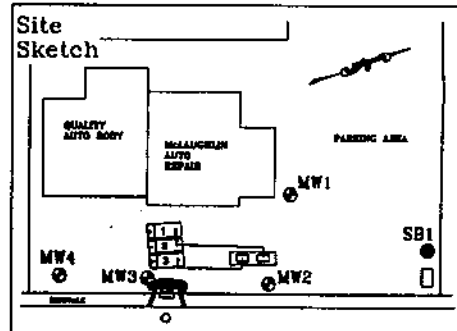
PROJECT McLAUGHLINS AUTO
 LOCATION WINOOSKI, VERMONT
 DATE DRILLED 12/6/94 TOTAL DEPTH OF HOLE 5.5'
 DIAMETER _____
 SCREEN DIA. 2" LENGTH 2.5' SLOT SIZE 0.010"
 CASING DIA. 2" LENGTH 2.5' TYPE sch. 40 pvc
 DRILLING CO. TRI-STATE DRILLING METHOD HSA
 DRILLER RAY & STORM LOG BY E. SANDBLOM

WELL NUMBER MW3



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
1		LOCKING WELL CAP			1
2		CONCRETE	0'-2'- 1,4,7,5 112 ppm	Brown fine SAND with orange varves, dry, slight petroleum odor.	2
3		NATIVE BACKFILL			3
4		BENTONITE	2'-4'- 2,1,3,4 1186 ppm	Brown fine well graded SAND over SILT layer, over fine red GRAVEL and SAND, strong petroleum odor.	4
5		WELL RISER		Brown very coarse SAND and GRAVEL with silt, saturated, strong pet. odor, sheen. 5.0' WATER TABLE	5
6		SAND PACK	4'-5.5'- 2,1,21,0 1069 ppm		6
7		WELL SCREEN		BASE OF WELL AT 5.5' END OF EXPLORATION AT 5.5'	7
8		BOTTOM CAP			8
9		BEDROCK			9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

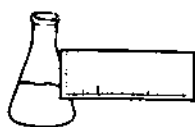
PROJECT McLAUGHLINS AUTOLOCATION WINOOSKI, VERMONTDATE DRILLED 12/6/94 TOTAL DEPTH OF HOLE 6.8'DIAMETER SCREEN DIA. 2" LENGTH 3.8' SLOT SIZE 0.010"CASING DIA. 2" LENGTH 2.5' TYPE sch. 40 pvcDRILLING CO. TRI-STATE DRILLING METHOD HSADRILLER RAY & STORM LOG BY E. SANDBLOMWELL NUMBER MW4

GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
1		LOCKING WELL CAP			1
2		CONCRETE BACKFILL	0'-2'- 4,15,10,10 188 ppm	<u>Pavement</u> Brown SAND and CLAY over coarse gray sand over black cinder, over brown fine sand, old petroleum odor.	2
3		BENTONITE			3
4		WELL RISER	2'-4'- 4,4,3,4 469 ppm	Gray SILT with some clay and coarse sand stained, old petroleum odor. strong petroleum odor.	4
5		SAND PACK	4'-6'- 2,3,1,2 660 ppm	Dark gray silty SAND with fine gravel, strong pet. odor.	5
6		WELL SCREEN	6'-6.8'- 6,20 729 ppm	Brown stained SAND and SILT over light brown sand, saturated.	6
7		BOTTOM CAP			7
8		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 6.8' END OF EXPLORATION AT 6.8'	8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
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23					23
24					24
25					25

APPENDIX E

LABORATORY SAMPLE ANALYSIS REPORTS



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994

PROJECT CODE: GIMA1691
REF.#: 68,748 - 68,753

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated samples were preserved with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

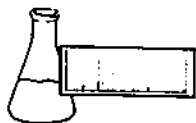
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994
DATE RECEIVED: December 14, 1994
DATE ANALYZED: December 20, 1994

PROJECT CODE: GIMA1691
REF.#: 68,748
STATION: MW-2
TIME SAMPLED: 13:27
SAMPLER: Jim Valley

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	50	466.
Chlorobenzene	50	ND ²
1,2-Dichlorobenzene	50	ND
1,3-Dichlorobenzene	50	ND
1,4-Dichlorobenzene	50	ND
Ethylbenzene	50	377.
Toluene	50	757.
Xylenes	50	1,610.
MTBE	500	ND

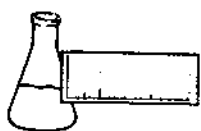
Bromobenzene Surrogate Recovery: 109%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 2% dilution.

2 None detected



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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994
DATE RECEIVED: December 14, 1994
DATE ANALYZED: December 20, 1994

PROJECT CODE: GIMA1691
REF.#: 68,749
STATION: MW-3
TIME SAMPLED: 13:45
SAMPLER: Jim Valley

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	500	29,600.
Chlorobenzene	500	ND ²
1,2-Dichlorobenzene	500	ND
1,3-Dichlorobenzene	500	ND
1,4-Dichlorobenzene	500	ND
Ethylbenzene	500	4,300.
Toluene	500	73,900.
Xylenes	500	26,500.
MTBE	5,000	38,600.

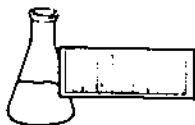
Bromobenzene Surrogate Recovery: 114%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 0.2% dilution.

2 None detected



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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994
DATE RECEIVED: December 14, 1994
DATE ANALYZED: December 20, 1994

PROJECT CODE: GIMA1691
REF.#: 68,750
STATION: MW-4
TIME SAMPLED: 14:00
SAMPLER: Jim Valley

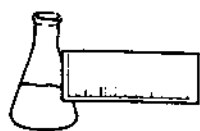
<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	100	2,270.
Chlorobenzene	100	ND ²
1,2-Dichlorobenzene	100	ND
1,3-Dichlorobenzene	100	ND
1,4-Dichlorobenzene	100	ND
Ethylbenzene	100	1,400.
Toluene	100	3,450.
Xylenes	100	6,130.
MTBE	1,000	1,230.

Bromobenzene Surrogate Recovery: 111%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 1% dilution.
- 2 None detected



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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994
DATE RECEIVED: December 14, 1994
DATE ANALYZED: December 20, 1994

PROJECT CODE: GIMA1691
REF.#: 68,751
STATION: Duplicate MW-2
TIME SAMPLED: 13:27
SAMPLER: Jim Valley

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	50	437.
Chlorobenzene	50	ND ¹
1,2-Dichlorobenzene	50	ND
1,3-Dichlorobenzene	50	ND
1,4-Dichlorobenzene	50	ND
Ethylbenzene	50	356.
Toluene	50	718.
Xylenes	50	1,540.
MTBE	500	ND

Bromobenzene Surrogate Recovery: 99%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 2% dilution.
- 2 None Detected



ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994
DATE RECEIVED: December 14, 1994
DATE ANALYZED: December 20, 1994

PROJECT CODE: GIMA1691
REF.#: 68,752
STATION: Trip Blank
TIME SAMPLED: 8:00
SAMPLER: Jim Valley

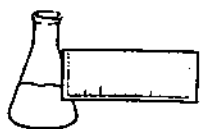
<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 95%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: McLaughlin's Auto
REPORT DATE: December 21, 1994
DATE SAMPLED: December 14, 1994
DATE RECEIVED: December 14, 1994
DATE ANALYZED: December 20, 1994

PROJECT CODE: GIMA1691
REF.#: 68,753
STATION: Equipment Blank
TIME SAMPLED: 13:35
SAMPLER: Jim Valley

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 93%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

Date/Time

... gases, semi-volatiles, metals, pesticides, herbicides)

APPENDIX C

Laboratory Report Forms



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Marin Environmental
PROJECT NAME: SMM Realty
REPORT DATE: May 28, 1998
DATE SAMPLED: May 21, 1998

PROJECT CODE: GWVT1793
REF.#: 121,237

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

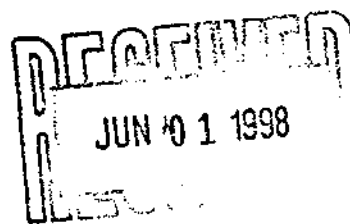
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures





ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Marin Environmental

DATE RECEIVED: May 22, 1998

PROJECT NAME: SMM Realty

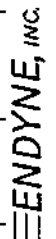
REPORT DATE: May 28, 1998

CLIENT PROJ. #: VT 98-0021-160

PROJECT CODE: GWVT1793

Ref. #:	121,237				
Site:	MW-3				
Date Sampled:	5/21/98				
Time Sampled:	15:50				
Sampler:	J. Gonyaw				
Date Analyzed:	5/28/98				
UIP Count:	>10				
Dil. Factor (%):	2				
Surr % Rec. (%):	101				
Parameter	Conc. (ug/L)				
Benzene	2,380.				
Chlorobenzene	<50				
1,2-Dichlorobenzene	<50				
1,3-Dichlorobenzene	<50				
1,4-Dichlorobenzene	<50				
Ethylbenzene	1,490.				
Toluene	822.				
Xylenes	6,880.				
MTBE	<50				

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated



CHAIN-OF-CUSTODY RECORD

27030

Project Name: SMM Realty UT 98-0021-160 Site Location:		Reporting Address: 1700 Hegeman Ave Colchester, VT 05446		Billing Address:	
Endyne Project Number: 66VT1793		Company: Marin Environmental Contact Name/Phone #: Brett D. Perkins		Sampler Name: Jay Gonyaw Phone #:	

Lab #	Sample Location	Matrix	Sample Containers			Date/Time	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
			G R A B	C O M P	No.					
121,237	MW-3	A20	✓		2	5-21-98 1550	19	HCL		
<div style="display: flex; justify-content: space-around;"> <div> <p>Card</p> <p>MF</p> </div> <div> <p>Card</p> <p>MF</p> </div> </div>										

Relinquished by: Signature <i>Brett D. Perkins</i>	Received by: Signature <i>Yang Paccini</i>	Date/Time 5-22-98	1103
Relinquished by: Signature <i>Yang Paccini</i>	Received by: Signature <i>Yang Paccini</i>	Date/Time 5/22/98	1115

New York State Project: Yes

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pes/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX + AA7 CSL	24	EPA 608 Pes/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										